SYSTEM FOR ACTIVATING A WEAPON WITH AN IDENTIFICATION MECHANISM

FIELD OF THE INVENTION

[0001] The present invention relates to a system for activating a weapon to a state of readiness to fire.

BACKGROUND OF THE INVENTION

[0002] In order to prevent the use of a weapon by unauthorized persons, it is known to provide a sensor on the handle of the weapon to receive an identification code. One example of such a sensor is a fingerprint reader. Since input of the identification code takes a certain amount of time, such a weapon is not suited for use in a dangerous situation.

[0003] Alternative systems are known, wherein the user of the weapon carries an identification mechanism, such as a wristband, a wristwatch, a ring, gloves or the like, which is compatible with the sensor to read-in the identification code. The identification code can be, for example, a PIN code or a fingerprint pattern. The authorized user of the weapon, for example a policeman, inputs the identification code into the identification mechanism at a suitable time, such as the beginning of his shift. After a positive identification code comparison, the transmitter of the identification mechanism signals the receiver in the weapon, and the weapon is enabled to fire.

[0004] To maintain the readiness of the weapon to fire, the identification mechanism transmitter continuously communicates with the receiver via a coded signal, for example, a frequency-modulated signal. In such a situation, it is only possible to fire a shot while the signal is communicated. The communication medium can be radio, ultrasound or infrared (compare U.S.

Patent No. 5 062 232, U.S. Patent No. 5 168 144, U.S. Patent No. 5 461 812, WO98/04880, WO00/49360, WO00/55562, WO00/65291, WO01/18332, DE 43 03 333A1).

[0005] However, in these systems, communication between the transmitter and receiver can be paralyzed by a third party. For example, a criminal using a strong interfering transmitter can interfere with the signal, and thus disable the weapon from firing. Other problems occur also. For example, during an action by the police or other security forces, a policeman cannot use the weapon of a colleague, which could be necessary if the policeman runs out of ammunition or if the colleague is injured.

SUMMARY OF THE INVENTION

[0006] The purpose of the present invention is to prevent the use of a weapon by unauthorized persons, while reliably assuring that the weapon is ready to fire in a dangerous situation.

[0007] According to the present invention maintaining the readiness of a weapon to fire depends exclusively on the strength of a signal which is continuously received by a receiver in the weapon. This signal strength must be at least as great as the strength of the signals the receiver receives when the transmitter in the user's identification mechanism is at a specified maximum distance from the weapon. For example, where the weapon is a pistol and the identification mechanism is carried on a wristband, the maximum distance between the wrist on which the wristband is secured and the holster plus a certain safety zone might be two to three meters. Therefore, maintenance of the weapon in an activation state is completely independent of the frequency of the

signals received by the receiver according to the present invention.

[0008] The communication between the identification mechanism transmitter and the receiver in the weapon can occur by radio, infrared or ultrasound signals according to the invention. Radio signals, in particular RF signals are, however, preferably used. Maintaining the readiness of the weapon to fire is therefore exclusively dependent upon signals received by the receiver having a field strength which corresponds at least with the field strength of the signals the receiver receives when the transmitter is at a specified maximum distance from the receiver. Thus, the weapon is activated as long as signals are received with a field strength which is equal to or greater than the field strength of the signals the receiver receives from the transmitter at the specified maximum distance. The frequency of the signals received is therefore irrelevant. Therefore it is of no importance to the present system how the signals are frequency-modulated or if the signals are coded in another manner for the weapon to maintain the readiness to fire.

[0009] Since, according to the present invention, only the strength or the field strength of the received signals is important, the readiness of the weapon to fire cannot be disturbed by an interfering transmitter. The weapons of a policeman or, in the case of a task commando, the weapons of all of the task forces can therefore no longer be rendered functionless by a criminal with a strong interfering transmitter.

[0010] At the same time, it is possible during such action for a person with an identification mechanism which continuously sends appropriate signals to use the

weapon of a colleague, if for example he has run out of ammunition or if the colleague is injured.

[0011] Of course it is possible for a criminal who has an interfering transmitter to tear the weapon away from the policeman or other authorized user, and to direct the weapon against him. However, a criminal will typically have a weapon in this case, or could obtain a weapon more readily than an interfering transmitter. Therefore, the potential for a criminal with an interfering transmitter, but without a weapon is an unrealistic possibility and this situation can be excluded from concern.

[0012] The identification mechanism carried by the weapon user can be integrated into a wristband, a wristwatch, a ring or a piece of clothing, such as gloves or the like, as indicated above. The identification code is preferably a biometric pattern, such as a fingerprint or the pattern of the user's hypodermic blood vessels, for instance those blood vessels on the wrist when used with a wristband. When a fingerprint is used as the identification code, a linear CCD (Charge Coupled Device) sensor is preferably used as the fingerprint reader. Such a sensor has fiber-glass optics, which permits only a vertical light incidence on the CCD sensor, with which the fingerprint pattern is scanned. Such a reader is preferable because it is rather insensitive to scratches.

[0013] The processor in the weapon is preferably a microchip, thus a microprocessor. The energy supply to the receiver, the microprocessor and any other necessary electronic/electric building components of the weapon can be provided by a battery or an accumulator. Thus the readiness of the weapon to fire can occur through an electromechanical unlocking carried out by an electromagnetic mechanism or through activation of the

electronics during an electronic ignition. Either the battery or the accumulator can then also power these mechanisms.

[0014] To increase the life of the current supply, a wake-up circuit is preferably provided in the weapon. This circuit activates the microprocessor and the receiver when the receiver receives the activating signal from the transmitter. The circuit also deactivates the microprocessor and the receiver when the receiver is no longer receiving signals or receives only signals with a strength less than those received from a transmitter within the specified maximum distance from the receiver.

[0015] According to the present invention, both the identification mechanism and the weapon are inactive in the initial state. The identification mechanism can include a switch which is initially turned on. The identification mechanism, for example the microprocessor of a fingerprint reader, is activated by this switch, which can be a Reed switch. When the identification mechanism is a wristband it is possible to close the switch when closing the wristband, thus activating the microprocessor.

[0016] In the above case, after closing the wristband at the start of a shift or prior to the use of the weapon, it is possible to input the identification mechanism or to read the fingerprint pattern without haste. After a positive comparison of the identification code by the microprocessor, here the fingerprints of the weapon user with fingerprints stored in a store in the identification mechanism, the identification mechanism is activated. In other words, an activation signal is sent to the receiver, which signal places the weapon into a state of readiness to fire. This activation signal can

be a coded signal, such as a frequency-modulated RF signal.

[0017] When the receiver in the weapon and the transmitter in the identification mechanism are each configured to send and receive signals, the sending and receiving system in the weapon can transmit an answering signal to the sending and receiving system in the identification mechanism, thus inducing a transmission from the weapon regarding the state of the readiness to fire which is directed to the identification mechanism. The state of the readiness of the weapon to fire or whether the weapon must yet be activated can be indicated on an indicator of the identification mechanism. For example, a symbol or a particular background color of the indicator could indicate the state of readiness of the weapon. For instance, the indicator could display an indicator light when the weapon is in an inactive state and no such light when it is an active state. Moreover, the indicator can also indicate further functions, such as the charging state of the current supply in the weapon and/or the identification mechanism.

[0018] When the weapon is activated, and thus ready to fire, the identification mechanism transmitter continuously transmits a signal of a specified strength to the receiver in the weapon to maintain the activation of the weapon. This signal can be sent intermittently or continuously. Since only the strength of the signal, or in the case of an RF signal the field strength of this signal, is important in the present system, an uncoded signal can be used to maintain the activation of the weapon.

[0019] According to the present invention, the receiver in the weapon is configured to detect the

strength, or in the case of a RF signal the field strength, of the signal. When the signal received by the receiver has a strength/field strength that is less than the strength/field strength programmed for the maximum specified distance from the identification mechanism, the weapon becomes inactive, or locked. This can occur when the user of the weapon places the weapon in a location and then moves away from that location or if the weapon is stolen from the user. When a wristband with a switch is used to carry the identification mechanism, the weapon will be deactivated when the wristband is opened, thus turning off the transmitter in the identification mechanism. This might occur at the end of a shift or after a task is completed and the wristband and weapon are put away.

[0020] The mechanism of the invention is designated in particular for locking hand firearms, such as pistols and guns.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The mechanism of the invention will be discussed in greater detail exemplarily in connection with the enclosed drawings, in which:

[0022] Figure 1 schematically illustrates an identification mechanism worn by the user of the weapon and a pistol with an exposed part;

[0023] Figure 2 is a perspective view of an identification mechanism in the form of a wristwatch; and

[0024] Figure 3 is a cross-sectional view of the wristwatch of Figure 2 along the section line III-III.

DETAILED DESCRIPTION

[0025] Referring to Figure 1 the user carries a weapon 1, such as a pistol 1, and an identification mechanism 2. When the identification mechanism 2 is carried on a

wristwatch as illustrated in Figures 2 and 3, the identification mechanism 2 is worn on the user's wrist. Such an identification mechanism 2 has a housing 3 and a wristband 4.

[0026] As illustrated in Figures 2 and 3, the identification mechanism 2 includes a sensor for detecting an identification code, namely a fingerprint reader 5, which is preferably a CCD sensor. The housing 3 also houses an accumulator 6, which is charged through a charging contact 7 or in another suitable manner, such as inductively. The fingerprint reader 5, an RF sender (of which only the antenna 11 is illustrated), an LCD indicator 12 and the other electronic components of the identification mechanism 2 are controlled by a microprocessor 9 which is included on a printed circuit 8. A function key 13 is provided on the identification mechanism 2 and is configured to indicate the name or the picture of the authorized user of the weapon on the display 12.

[0027] A contact 14, such as a Reed contact, is provided on the housing 3. The contact 14 is closed when the wristband is fastened on the housing and closed. A magnet 15 is provided for this purpose in the catch on the wristband 4.

[0028] The microprocessor 9 has a store where the fingerprint pattern of the authorized person, or other identification code, is stored. The microprocessor 9 is configured as a comparator which compares the input fingerprint with a stored fingerprint. When the fingerprints match, the receiver 11 sends an activating signal 16 to the weapon 1 (Figure 1).

[0029] The weapon 1 includes a module 20, on which a receiver (of which only the receiving antenna 17 is

illustrated), and a microprocessor 18 are included. The microprocessor 18 is configured to activate the weapon 1 upon receipt of an activation signal 16, thus placing the weapon 1 in a state of readiness to fire. The weapon 1 is placed in this activated state by the unlocking of an electromechanical locking mechanism (not illustrated) or a similar safety mechanism.

[0030] Once the weapon 1 is activated by the signal 16, the distance A between the identification mechanism 2 and the weapon 1 is continuously monitored. This is so the weapon 1 is deactivated if the distance A exceeds the maximum preset distance from the identification mechanism 2 while the user carries the weapon 1, such as in a holster.

[0031] The transmitter 11 in the identification mechanism 2 continuously emits signals 19 toward the receiver 17 in the weapon 1 for the distance measuring function. When the field strength of the signals 19 received by the receiver 17 is less than the field strength of the signals 19 which the receiver 17 receives when the transmitter 11 of the identification mechanism 2 is at the specified maximum distance A from the receiver, the microprocessor 18 deactivates the weapon 1, thus placing the weapon in a state in which it is prevented from firing.

[0032] A battery 21 supplies current in the weapon 1. A wake-up circuit is housed in the microprocessor 18, which turns on the microprocessor 18, the receiver and the other electronics in the weapon after receipt of an activation signal 16. The circuit is configured to turn off these components when continuous signals 19 are no longer received or when the signals 19 received from the

receiver 17 have a field strength below the minimum field strength.

[0033] The indicator 12 indicates through the symbol x or through the illustrated light background if the weapon is locked. In one instance, the background of the indicator 12 could be dark if the weapon is live. The indicator 12 can include other symbols which represent a foreign interference frequency, a request to apply the finger or the like. In addition, the bar 22 indicates the charge state of the battery 21 or the accumulator 6.

[0034] To facilitate indication of the charge state of the battery 21, the transmitter 11 and the receiver 17 can each be configured as a sending and receiving system. This will allow the weapon 1 to transmit an answering signal to the sending and receiving system in the identification mechanism 2 once it is activated after receiving an activating signal 16. Thus a return signal will be transmitted by the weapon 1 to the identification mechanism 2 confirming the state of the readiness of the weapon to fire.